FAA | AVIATION NEWS

JANUARY 1966

F E D E R A L A V I A T I O N A G E N C Y

FAA | AVIATION NEWS

F E D E R A L A V I A T I O N A G E N C Y

VOL. 4, NO. 9 JANUARY 1966

COVER

Business was never better in the American aviation community. Production of all types of aircraft reached 10,064 in 1964. Dollar value was $1.1 billion, 66% over 1963.

FAA AVIATION NEWS is published monthly by the Office of Information Services, Federal Aviation Agency, Washington, D. C., 20553, in the interest of aviation safety and to acquaint readers with the policies and programs of the Agency. The use of funds for printing **FAA AVIATION NEWS** was approved by the Director of the Bureau of the Budget, July 14, 1965.

Subscription rates: U.S. $1.50 a year, foreign $2.00 a year, single copies 15 cents. Send check or money order (no stamps) as well as address changes to Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.

In requesting a change of address, subscribers should include the mailing label from any issue to facilitate the change.

CONTENTS

3 LOWER MINIMUMS ARE PROPOSED FOR LARGE GENERAL AVIATION AIRCRAFT

3 GROWTH IN AVIATION IS REFLECTED IN NEW HANDBOOK

4 CALIFORNIANS DEVISE 'AIRMAN'S PLEDGE' IN FLIGHT SAFETY PUSH

4 FAMOUS OLD NAME ADDS NEW PLANE

4 PASSENGER DRINKING BAN IS APPLIED TO HELICOPTERS

4 FAA TO 'LET WELL ENOUGH ALONE' IN AIR TRAFFIC JARGON CHANGE

5 BOOKLET DISSECTS WAKE TURBULENCE ANATOMY

5 SIKORSKY'S SKYCRANE CAN LIFT ITS OWN WEIGHT

5 AIRPORT INDUSTRIAL PARK DATA FREE FOR THE ASKING FROM FAA

5 ATLANTA HIGH SCHOOL STUDENTS UP IN THE AIR WITH NEW COURSE

6 FREE! FLIGHT FILM FARE

7 IN MICHIGAN . . . RUNWAY ARTISTS MAKE THEIR MARK

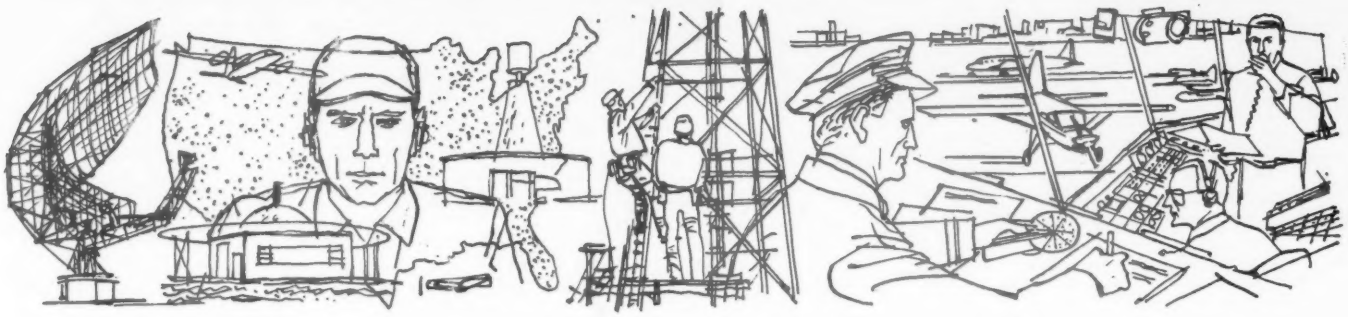
8 SAFE FLYING IS IN—IN IOWA

10 SAFETY FIRST: TORQUE: THE OTHER FORCE IN FLIGHT

12 RX FOR SNOW: HIGH SPEED TEAM PLOWING

14 FAMOUS FLIGHTS: HINDENBURG . . . DEATH OF AN ERA

15 LETTERS



LOWER MINIMUMS ARE PROPOSED FOR LARGE GENERAL AVIATION AIRCRAFT

The FAA has proposed a new rule which would reduce airport landing weather minimums for general aviation aircraft either weighing more than 12,500 pounds or of the small turbojet type. The new minimums would be equal to the lowest weather conditions in which commercial transport planes currently may land at weather-shrouded airports.

Designated "Category II" in the FAA's all-weather landing program, the new minimums would reduce the current runway visibility limit from 2,600 feet RVR (runway visual range) to 1,600 feet RVR initially, and eventually to 1,200 feet RVR.

The Category II proposal for general aviation operators is premised upon more stringent pilot qualification and proficiency requirements, approval of airplane equipment installation and rigid maintenance programs, and improved airport ground facilities.

Special Authorization Required

Pilots would be required to obtain special authorization to make landings in Category II weather based on experience and demonstrated skill. Each authorization would be good for six months and would apply only to the particular make and model of plane and equipment used in the flight tests.

Approval of Category II airborne electronic and navigational equipment could be obtained by one of two methods. One would be to obtain approval of the equipment and installation at the time of the original certification of an aircraft or under a subsequent supplemental type certificate. The alternate method would be to obtain approval through an evaluation program designed to prove, during actual flight, the performance of equipment already installed in the plane. Using this method, the applicant would be required to make at least 50 approaches to landing down to the level of 100 feet above the airport surface using the Category II system.

In 90 per cent of the approaches, some of which would be monitored by inspectors from the Federal Aviation Agency, the pilot would have to be able to complete a normal landing from the 100 foot "decision height."

Under present regulations, most electronic and navigational equipment in general aviation aircraft is inspected only during 100-hour periodic or progressive checks. Since one of the key factors in Category II operations is accuracy and reliability of airborne equipment, the FAA proposal would assure optimum performance by requiring a comprehensive maintenance program.

Criteria and guidelines of Category II weather minimums for air carriers and commercial operators were contained in an *FAA Advisory Circular* issued Oct. 2, 1964. Corporate and business aircraft operators subsequently expressed an interest in obtaining similar authority.

Possible inclusion of other types of general aviation aircraft in the Category II all-weather landing program also will be considered by FAA if comments received on the notice of proposed rule making on or before Feb. 23, 1966, indicate an interest and a need.

Growth in Aviation Is Reflected in New Handbook

Civil aviation activities soared to new heights in 1964, according to the 1965 edition of the *FAA Statistical Handbook of Civil Aviation* released last month by the FAA.

Aircraft production valued at $1.1 billion was 66 per cent higher in 1964 than the $642 million for 1963. A record 10,064 aircraft of all types were produced. The increase is due to stepped-up manufacture of general aviation fixed-wing aircraft which numbered 9,449, as compared with 7,628 in 1963. The production of 165 transport-type aircraft in 1964 more than doubled the number of transports shipped in 1963. Rotorcraft production rose from 413 in 1963 to 450 in 1964.

Airline revenue passengers totaled 88.5 million in 1964, a 14 per cent increase over the 77.4 million in 1963. The airlines flew 58.5 billion revenue passenger miles (one paying passenger flown one mile) in 1964, a 16 per cent increase over the 50.4 billion passenger miles flown in 1963.

Nearly 1.1 million tons of air cargo were flown 1,379.8 million ton-miles (one ton flown one mile) in 1964, as compared to the 908,800 tons flown 1,097.4 million ton miles in 1963.

The number of public and privately owned airports reported increased eight per cent in 1964 to 9,490 airports, contrasted to the previous year's 8,814. Publicly owned airports totaled 3,644 compared to 3,451 the year before, and private airports increased from 5,363 to 5,846.

FAA air route traffic control centers handled a record 11.7 million aircraft flying under Instrument Flight Rules in 1964, a 10 per cent increase over the 10.6 million reported in 1963.

Airport traffic control towers recorded 34.2 million landings and takeoffs, a 10 per cent increase over the 31 million reported in 1963.

The 90,935 active civil aircraft registered with the FAA in 1964 represent a four per cent increase over the 87,267 active civil aircraft reported the previous year. It is a 50 per cent increase over the 60,432 active civil aircraft registered 10 years ago.

Active pilots increased to 431,041 over the 378,700 reported in 1963. Original issuances of pilot certificates rose 24 per cent to 121,372 as compared with 98,014 in 1963.

The *FAA Statistical Handbook of Civil Aviation* is the standard summary of official statistical data on the status of civil aviation activity in the U. S. Statistics are divided into chapters on the FAA, airports, federal airways system, aircraft and airmen, general aviation, aeronautical production, U. S. air carrier fleet, air carrier operating data, airport activity statistics and aircraft accidents. It may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, for $1.00.

Californians Devise 'Airman's Pledge' in Flight Safety Push

A California organization of aircraft owners and pilots has established an "Airman's Pledge" in the belief that "a safe pilot is one who recognizes his own limitations and who conducts his flying activity accordingly." While the FAA does not officially endorse pledges or rules established by private organizations, it does encourage the adoption of high safety standards.

The Valley Airmen's Association of Encino, Calif., P. O. Box 743, requires its own pilots to sign the pledge which "provides a sensible guide which any pilot can voluntarily live by, regardless of his level of experience and proficiency." The group now offers copies of the pledge, in duplicate, to any flying club, group or organization for dissemination to its members, and asks that one signed copy be returned. There is a small charge to cover printing and postage.

The "Airman's Pledge" includes:

- I shall look upon my license to fly as a privilege to which I shall be entitled only as long as I execute this privilege strictly within the limits of my ability and experience.
- I shall conduct a thorough inspection of my aircraft prior to every flight and I shall refrain from flying in any aircraft with a known operational defect.
- I shall check the weather prior to every cross country flight and, when filing a flight plan, shall remember to close it upon arrival at my destination.
- I shall carry passengers only in an aircraft with which I am familiar and in which I have had adequate recent experience.
- I shall fly at legal altitudes at all times and refrain from making unauthorized low passes, hedge-hopping, buzzing and similar childish stunts which constitute a danger to myself and others.
- I shall report unusual weather and atmospheric conditions as soon as possible to the nearest radio facility.
- I shall refrain from flying close to or entering into weather conditions considered marginal with reference to my capabilities, experience and equipment aboard the aircraft.
- I shall refrain from entering an aircraft when recently having partaken of drugs, alcohol or other debilitating substances. . . . (*See cartoon page 16.*)
- I shall conduct myself in the process of operating an aircraft and at all other times in a manner giving a favorable impression of aviation and the flying community.

Famous Old Name Adds New Plane

Following FAA certification, the nimble Douglas DC-9 twinjet, with a top cruising speed of 560 m.p.h., went into daily scheduled service last month. Joseph H. Tippets, director of FAA's Western Region, presents the Agency's type certificate to Donald W. Douglas, center, chairman of the board of Douglas Aircraft Co., and his son Donald W. Douglas, Jr., company president. They are flanked by FAA's C. H. Hawks, left, and Jackson McGowen, right, of Douglas.

Passenger Drinking Ban Is Applied to Helicopters

Passengers riding in helicopters operated by scheduled air carriers are prohibited from drinking alcoholic beverages unless served by the carrier, under new rules issued last month by the FAA.

The operators also are prohibited from serving drinks to persons who appear intoxicated, or allowing persons who seem intoxicated to board the aircraft.

Similar rules affecting scheduled fixed-wing airlines and their passengers have been in effect for some time.

Carriers are required to report drinking violations to FAA within five days.

The new rules also require the carrier to assign individual emergency evacuation duties to helicopter crewmembers. Previously, helicopter operating rules only required that the crew be trained to perform passenger emergency evacuation functions, but did not cover specific crew assignments to be carried out in emergencies.

Evacuation functions, similar to those assigned regular airline crews, would take into account reasonably anticipated emergencies and the possible incapacitation of other crewmembers or inability to reach the passenger cabin because of an unexpected problem such as shifting cargo.

The new regulations are based on an earlier FAA Notice of Proposed Rule Making, which was favorably received by all who responded. They modernize present helicopter operating rules which have been in force since 1958, when passenger helicopters were generally small and required only a pilot.

FAA To 'Let Well Enough Alone' In Air Traffic Jargon Change

A proposed rule which would have redefined the terms "air traffic control" and "air traffic control clearance" and would have dropped use of the term "air traffic control instruction" has been withdrawn.

In taking the action, FAA noted that the consensus of the aviation community was that the proposed rule would not achieve its primary objective which was to clarify the respective responsibilities of pilots and controllers.

The proposed rule (Notice 65-11) was published last May 20 with a 60-day comment period. A public hearing on the proposal also was held on Sept. 20 with most of the major aviation interests making presentations.

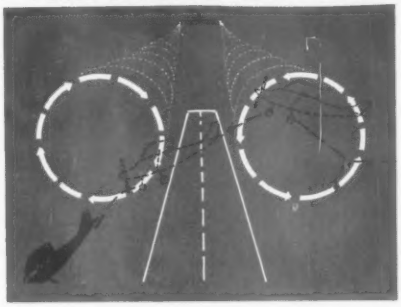
BOOKLET DISSECTS WAKE TURBULENCE ANATOMY

A new pocket-size booklet dealing with wake turbulence—a phenomenon pilots once called "prop wash"—is being mailed by the FAA to all licensed pilots holding a current medical certificate.

The 16-page illustrated pamphlet is aimed primarily at pilots of light to medium single- and multi-engine aircraft which are particularly susceptible to the hazards of wake turbulence. The booklet describes these hazards and suggests techniques for avoiding them.

The most dangerous type of wake turbulence, the booklet points out, is created by the wings of an aircraft in flight. Air spilling about the wing tips forms two distinct vortices which trail behind each wing. These vortices resemble invisible tornadoes and may present a hazard to any aircraft penetrating them. (See *FAA Aviation News,* June 1965.)

As might be expected, large jet transports generate the most intense vortex turbulence. A light plane caught in the wake of such large aircraft could be forced out of control. Wake turbulence can also cause structural failure.



Wake turbulence is especially hazardous in the vicinity of airports, the pamphlet explains. It suggests precautions to be followed by pilots during landing and takeoff operations.

Distribution of the booklet is being made in connection with FAA's continuing safety education program. Copies of the publication also will be available from the Agency's 82 general aviation district offices.

A color film, running approximately 15 minutes, also is being prepared by FAA on the subject of wake turbulence. It will be released later this year.

Sikorsky's Skycrane Can Lift Its Own Weight

The Sikorsky helicopter S-64A Skycrane, *a universal transport vehicle with both industrial and military potential, has been type certificated by the FAA. The new chopper, which weighs 17,240 pounds and has a maximum speed of 124 m.p.h., does such jobs as towing barges, pulling heavy vehicles from mire, and winching up any 17,000 pound load it can straddle.* The Skycrane *demonstrates its ability above by lifting a pontoon bridge section weighing seven tons.*

Airport Industrial Park Data Free for the Asking from FAA

Two FAA advisory circulars are now available to assist communities in preparing airport layout plans and in developing airport industrial parks.

Planning the Airport Industrial Park analyzes the advantages of this type of airport planning for various types of communities, describes suggested steps that may be taken in developing an airport industrial park, lists the available sources of funding and provides maps and data on recently completed industrial airparks.

Preparation of Airport Layout Plans is a detailed guide for communities seeking to improve their airport facilities with the assistance of matching grants under the Federal-Aid to Airports Program. An application for a grant of matching Federal funds requires the submission of a layout plan in accordance with FAA standards set forth in the advisory circular.

Advisory circulars AC 150/5310-1, *Airport Layout Plans,* and AC 150/5070-3, *Airport Industrial Parks,* are available free from the FAA Distribution Section, HQ-438, Washington, D. C. 20553.

Atlanta High School Students Up in the Air With New Course

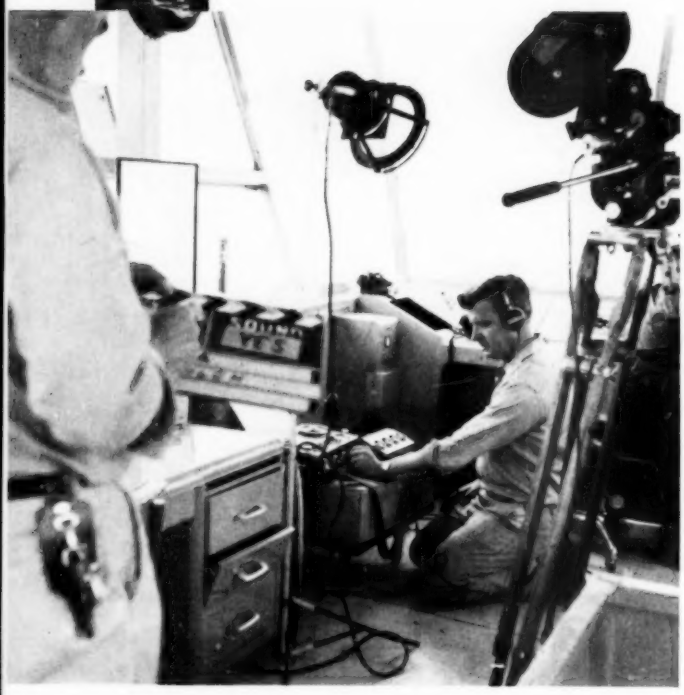
Scores of high school students are studying basic aviation subjects as part of their regular curriculum at three Atlanta high schools.

A milestone in aviation education, the program is designed to meet the expanding needs of aviation. While Atlanta is called the most advanced example, many similar programs are being initiated in a number of states including Maryland, Florida, Michigan, Nebraska, Kansas and California.

Paul Sanderson, president of the Wichita, Kan., firm that specializes in audio-visual ground school courses for pilots, said his company has added illustrative material for high schools, but otherwise the courses differ only in length of time from the standard courses for pilots. He said that student interest in aviation courses was high and quoted a teacher who termed aviation the "anti-dropout" program.

Some schools are making arrangements with local airport operators to rent or lease aircraft for flight instruction. In some cases, flight instructors will be employed by the school system to provide flight instruction. In Atlanta, students will receive 10 hours of flight time.

Free! *flight film fare*



Movies are better than ever, especially those produced by the Federal Aviation Agency and made available to the public on a free-loan basis. All are 16 mm sound productions and most are in color.

Although the films generally deal with FAA's role in maintaining and improving safe flight, each has a specific theme. They have been shown as public service television features, as training aids for general aviation pilots, as career information to high school and college students, and, popularly, as entertainment or educational fare for civic, social, church and other general public groups.

General Aviation Films

Several FAA films are aimed specifically at general aviation pilots. One, *Private Pilot* (15 minutes), follows a family on a cross country business and pleasure trip and shows various FAA services used by private pilots and general aviation. Another, *One Eye on the Instruments* (15 minutes), is designed to encourage general aviation pilots to take advantage of the FAA's Blue Seal Certification Program. The story describes the ability of two local pilots—one an old pro who flies by the seat of his pants; the other, a younger pilot who has taken instrument training. The film vividly dramatizes the hazards of getting caught in IFR weather without knowing how to fly by instruments.

The subject of weather is given the Walt Disney treatment in four Navy films available from FAA. *Fog and Low Ceiling* is a two-part production: The first part (23 minutes) presents a detailed analysis of weather conditions conducive to fog; the second (nine minutes) illustrates how upslope fog, frontal fog and low stratus clouds are generated, and how they affect flying. The other two in this Disney group, *The Cold Front* (15 minutes) and *The Warm Front* (18 minutes), demonstrate the hazards of fronts, how to identify them and how to avoid them in flight.

Flight, a 28-minute FAA documentary which won a first-place award in the New York Film Festival, provides an over-all view of the activities and responsibilities of the FAA. The film traces the flight of a jet airliner from Los Angeles to New York, weaving in the various roles played by FAA personnel to safeguard the flight.

A Traveler Meets Air Traffic Control also follows a routine, commercial jet flight, but this one emphasizes the complex system and the men who operate it. Running 33 minutes, the film explains in lay terms how FAA air traffic controllers in towers and centers work together to operate the air traffic control system to assure the safety of all who use the airways.

A more technical film on this subject is directed to IFR pilots. The principles of en route air traffic control are explained in *What's My Traffic?* (25 minutes) and is used in basic en route training, as well as for terminal and station cross-training.

Features Value of Airport

Another public-interest film, one which has proved to be one of the Agency's most popular, is *The Best Investment We Ever Made.* This 23-minute movie uses real-life people to depict how an airport can be an economic boon to a small community. It has been a valuable and persuasive tool for convincing municipal officials and residents of the advantages of building an airport in their locality.

The FAA film library contains other motion pictures geared to carry the aviation story to diverse audiences. Any of the above films, or a listing of the other films produced primarily for public use, may be obtained without charge from the FAA Film Library, FAA Aeronautical Center, P. O. Box 1082, Oklahoma City, Okla. 73101. When requesting films, please indicate alternate choices.

Left: All weather markings at Capital City Airport in Lansing are crisp and sharp. **Above:** This is the gadget that does the trick: Ned Patterson aboard. **Below:** Capital City Airport's instrument runway all dolled up.

In Michigan . . .

runway artists make their mark

More and more small, single-runway airports in Michigan are beginning to look like their big city counterparts.

Beginning in August 1964, the Michigan Department of Aeronautics started a program for runway marking, primarily for the smaller paved strips throughout the state, by providing funds on a matching basis. Two of the main reasons for undertaking the project were to make the runways more visible to pilots and to give pilots a ready reference to runway magnetic direction.

At first, 10 small airports with an average runway length of 3,000 feet, and each with only one paved runway, were marked with VFR markings. Then, in 1965, Michigan authorities singled out an additional 36 airports, again mostly smaller airports with one runway, for the painters' attention. By August, about half of these were completed and work continued on the others.

Costs are held to a minimum under the Michigan plan in which the local community supplies the paint and manpower, and the Department of Aeronautics provides one man and the necessary equipment.

Future plans call for the program to continue, but with square foot charge to cover cost of labor, paint, application equipment and other contingencies. A price tag has yet to be established.

A painting machine devised by Ned Patterson of the Michigan Department of Aeronautics is a triumph of ingenuity over cost and provides precision control of paint flow, density and application.

It consists essentially of a small garden-variety tractor, compressor and tank. It differs from most systems in that no air is utilized in the painting system. The paint is atomized right in the nozzle and applied directly to the runway. This speeds application time so that a denser, longer-lasting coat can be achieved.

A pick-up truck, manned by one man, takes the equipment to the field where with the assistance of local labor, it is not unusual to be able to complete marking a runway in one day.

safe flying is IN in IOWA

It's fashionable to fly safely in Iowa.

It was more than two years ago, on Nov. 9, 1963, that the Iowa Aeronautics Commission and Iowa State University co-sponsored their first general aviation seminar. That very day, two pheasant hunters flew in from Illinois, ran into bad weather and crashed near Vinton, Iowa. Both men were killed.

From that date until last July there were no fatal accidents in Iowa. And the medical history of the family of the pilot in the July accident, coupled with the action of the aircraft, indicates that it may not have been an aircraft fatality—rather the pilot may have had a fatal heart attack. Iowa aviation officials waited for the autopsy report with great concern; they did not want the no-fatality record marred. While the autopsy was inconclusive, the pilot did have two brothers who died of heart attacks, one while driving a tractor and the other while driving an automobile.

FAA/CAB records indicate that only five states went without a fatal accident for any one year period from 1961 through 1964. Four of the states were in New England and the fifth was Iowa which has many more aircraft than the others.

Figuring no state could be that lucky without good reason, the FAA sent two experts from Washington, Jay A. McCausland and J. A. McPeeke, to dig out the facts. The assignment proved to be an easy one: There was no secret to the excellent record achieved by the pilots of Iowa. Basically, it is this—pilots in the Hawkeye State are safety conscious; safe flying is *in* in Iowa.

If Iowa pilots are in fact more safety conscious than pilots of some other states, the FAA wanted to know why. This too was easy to determine—it was brought about largely by the unusually fine cooperative effort among the state's fixed-base operators, flight instructors, Iowa Aeronautics Commission, State University and FAA General Aviation District Office (GADO) in Des Moines.

The McCausland-McPeeke report set out eight reasons that contributed to Iowa's enviable record, including several which underscored the fine flying attitude existing in the state:

1—The Iowa Aeronautics Commission blends its activities in with the activities of the FAA to avoid duplication and to receive the significant benefits that flow from a cooperative relationship. They help each other rather than compete or conflict. One strong point in the program of the Iowa Aeronautics Commission is to push for well-managed, well-lighted airports. Small political subdivisions are urged to accept the *responsibility* of managing municipal airports. While McCausland and McPeeke thought the pilot who stated that "from any place over Iowa at 5,000 feet you can glide to a lighted airport" may have been exaggerating a bit, they state, "It is apparent that the Commission is successful in its airport program."

2—The Iowa Aeronautics Commission keeps its pilots well informed. Charging a $1 registration fee, it is able to give each pilot a subscription to its monthly *Aviation Bulletin,* an aeronautical chart of the state and the comprehensive *Iowa Airport Directory* which lists all the airports in the state currently registered with the commission. The foreword informs the pilot that the *Directory* will be "of considerably more value . . . if you frequently consult your state commission's *Aerogram* notices and FAA *Notices to Airmen* which can be found on the bulletin boards of most of the airports described therein. In this way, you will always know the very latest conditions existing at whichever of these fields you have chosen as a destination."

3—The efficiently run GADO reflects the initiative and enthusiasm of FAA specialists who take pride in doing a good job. An example of the thoroughness of the maintenance inspectors is the work schedule programed one year in advance so no operation or activity is overlooked.

4—Iowa State University, in cooperation with the Commission and FAA, conducts popular flight courses, clinics and seminars. For example, last year more than a third of some 300 Iowa flight instructors paid their own way to attend a flight instructors clinic on a day when the whole northern tier of the state could not participate because of a blizzard.

5—Weather in Iowa follows readily predictable patterns and it is relatively easy for pilots and weather experts to make forecasts.

6—The State of Iowa is generally flat; there are no real mountains for pilots to fly into.

7—VFR navigation is relatively easy with the state lined off in clearly defined section lines.

8—A favorable competitive situation in Iowa has minimized the economic pressures on fixed-base operators so they and their instructors are not inclined to cut corners in flight training. Thoroughly trained customers become very proud of their skill in handling today's more complex aircraft.

The close and harmonious relationship between the Iowa Aeronautics Commission, the State University, the FAA and the fixed-base operators and their instructors affects typical pilots in Iowa to the point where a large percentage of them *think* "safety" when they fly and view an accident in Iowa with personal concern. An accident within the borders of the state is regarded as a blemish on the Hawkeye record, as well as a personal tragedy for those involved.

Above, Director Frank Berlin of the Iowa Aeronautics Commission, left, reviews Commission publications and posters with Louis W. Wolverton, safety officer.

Top, J. H. Ostiguy, supervising inspector of the FAA General Aviation District Office in Des Moines, checks the map of his district to plan his next inspection trip.
By prop, instructor Jon Whisler, right, of the Des Moines Flying Service, runs over a preflight check list with Dave Moede, a 17-year-old student. The efforts of Iowa instructors and fixed-base operators contribute to Iowa's outstanding record.
Right, busy William J. O'Keefe, an Agency flight service specialist, gives a pilot briefing on weather conditions.

Left, the six men strolling on the runway in Des Moines personify the spirit of cooperation existing between all elements of aviation in Iowa. From the left, three men from the Commission, Robert Nemers, Louis W. Wolverton and Frank Berlin; FAA's J. H. Ostiguy; Howard Gregory, representing fixed base operators and instructors, and Burt Watkins, representing Iowa State University in the safety education program.

SAFETY FIRST

TORQUE: THE OTHER FORCE IN FLIGHT

Torque and 'P factor' can give even 'old' pilots tense times

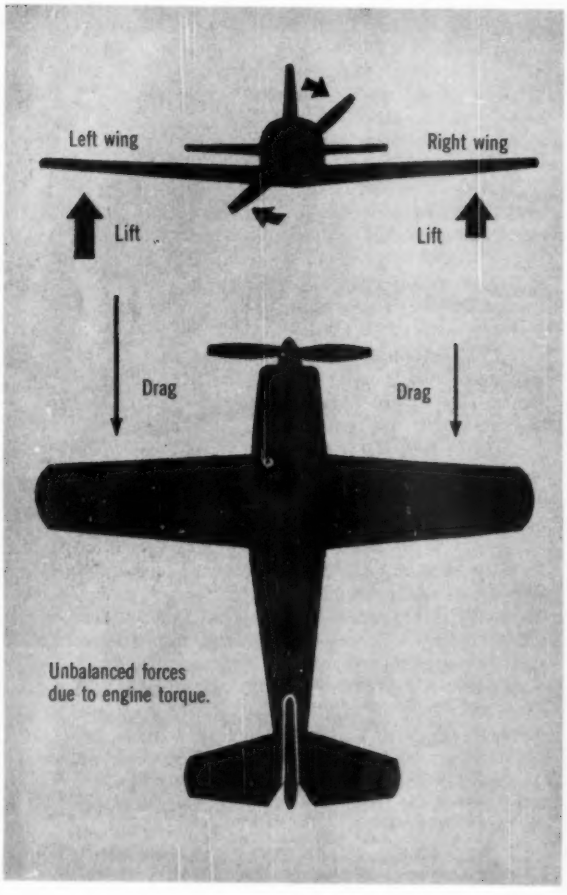
Mention torque and the "P factor"—their cause and effect and how to live with them—and you've got the makings of a lively discussion.

In flight training in *low performance* aircraft it is generally taught that torque and "P factor" are of prime concern. In high performance aircraft which feature wing sweep, advanced design engine mounting and high lift devices, to name some characteristics, torque and "P factor" are of varying concern depending on specific design.

Why do most American manufactured planes have a tendency to turn left on takeoff and climbout? This wayward inclination is sometimes laid to the "P factor" and sometimes to torque, the force which tends to produce a rotating or twisting motion. Both contribute to this aerodynamic phenomenon.

The most significant torque producing force in a propeller driven airplane is created by the rotating propeller. Viewed from the cockpit, propellers in most aircraft built in the United States turn clockwise. The propeller, swinging down to the right, exerts a torque force that tends to rotate the plane to the left.

The way to counteract torque is readily at hand. It is standard practice for manufacturers to rig the left wing with a slightly higher angle of incidence, creat-



1. Propeller rotation is clockwise from pilot's point of view.
2. Clockwise rotation of the propeller imparts a clockwise "twist" to slipstream.
3. The left side of the airplane is acted upon by air which acts to turn the airplane to the left.

ing what is commonly called "wash in." In pusher aircraft and in the rare American plane equipped with a prop spinning counter-clockwise, the "wash in" is built into the right wing.

"Wash in" has its limitations since it can compensate for engine generated torque only at a specific power setting and air speed. To provide maximum benefit to the pilot, wings are rigged for cruising power and airspeed values. At other than cruise, the "washed in" left wing produces more lift, but also causes additional drag. This causes the plane to turn left unless something is done, besides constantly applying right rudder, to counteract this tendency. Setting the leading edge of the vertical stabilizer off to the left a small amount gives the same effect as applying slight right rudder, and is sufficient to cancel out the inclination to turn left at cruising speed.

An easy test for correct rigging can be made in flight at cruising speed using the trim control only. To verify the tendency of the aircraft to turn left, raise the nose with the trim control. If the plane begins to roll and turn left *as it loses speed*, the rigging is correct because the fixed settings of the wing and vertical fin are insufficient at less than cruising speed to counter the torque produced by the engine.

If the airplane is then nosed down with the trim control only, it will tend to roll and turn to the right as the speed increases because at higher-than-cruising airspeed the fixed settings are more than enough to overcome the engine torque.

Since the rolling effect of torque is greatest at the maximum power settings used for takeoff and climb, it is necessary to use some force on the ailerons to maintain directional control. Application of aileron control, usually to the right, adds drag to the left wing, creating a tendency for the plane to turn left during takeoff and climb.

It is routine instruction procedure to tell students they must hold right rudder on takeoff and climb to compensate for torque. This is not the whole truth —there are other factors which contribute to the left turning propensity of American planes.

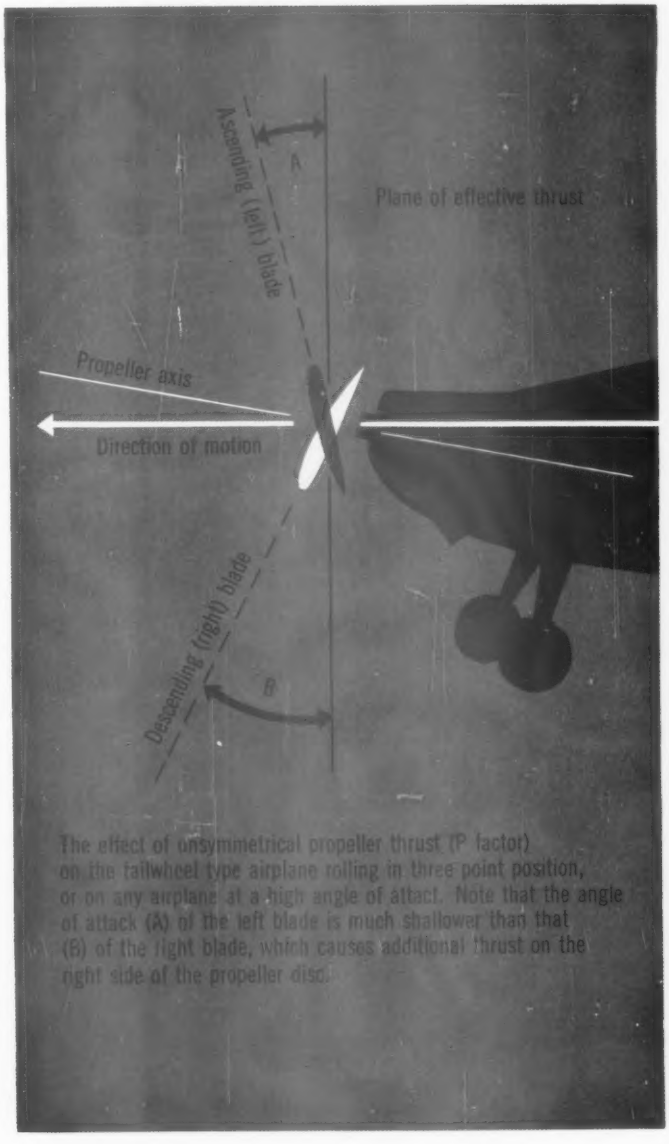
Here's where the "P factor" comes in. This is defined as the asymmetrical thrust delivered by the propeller, especially in single engine aircraft, when the flight attitude is changed. As long as the prop screws its way through the air in a direction absolutely parallel to the shaft on which it is mounted, the thrust is uniform all around its plane of rotation.

If the angle is changed, however, as in a climb or takeoff, the propeller blade as it descends on the right side of the aircraft has a much higher angle of attack than it has on the left, or ascending, side. This greater thrust will turn the plane to the left. The greater the angle of attack, the greater turning effect created by the "P factor." This is a characteristic of tailwheel craft on the takeoff roll and of *all* aircraft upon liftoff.

The effects of torque and asymmetrical thrust are present in both single- and multi-engine aircraft.

Torque and the "P factor" have fueled many a hangar flying session and will continue to do so as long as men fly. There are *yea* and *nay* sayers but it is the end result that counts—flying safety. Just watch your "Ps" and "Ts"—your "P factor" and your torque.

What 'P' Factor Is All About



The effect of unsymmetrical propeller thrust (P factor) on the tailwheel type airplane rolling in three point position, or on any airplane at a high angle of attact. Note that the angle of attack (A) of the left blade is much shallower than that (B) of the right blade, which causes additional thrust on the right side of the propeller disc.

Snow jobs come high. While the stuff is delivered free of charge, it's the removal that costs the money.

An estimated $900,000 was spent last winter for the removal of snow, ice and slush from runways, taxiways and ramps at just eight major airports.

There is no magic ingredient in snow removal—it remains a contest between man and nature. Experts are agreed on two main points: Hit the snow early to keep ahead of it, and deploy a maximum force of machinery. This evaluation of the problem enabled John F. Kennedy International Airport to remain open every day of 1964, except for Jan. 13 when a record storm put the field out of commission for eight hours—from 5:30 p.m. to 1:30 a.m. Chief weapon in this battle was the rotary cab-on-plow which clears a path 8½ feet wide, hurling snow at about 2,000 tons per hour. A 335-h.p. diesel engine drives the rotary unit and a 220-h.p. diesel drives the vehicle. Crew: One man.

The technique used at JFK, and several other major airports, is described as "high speed team plowing." It is now in its fifth season and is a giant step forward in keeping airports as snow-free as possible in the least time. Using special equipment and techniques now available, it is possible to carry out clearing operations at speeds up to 25 m.p.h. The practical speed, however, is closer to 15 to 18 m.p.h.

The key piece of equipment is the rotary snow plow that gorges itself on a windrow of snow piled up by ordinary blade-type plows moving in echelon to the right in front of the rotary. The rotary hurls the collected snow in a cascade clear of the runway edge and runway lighting. A "long throw" of 115 feet is considered ideal for most runways.

Clearing operations generally start down the right side of the centerline of the runway. Three ordinary snow plows, rotary sweepers or road graders precede the snow thrower, clearing a swath of about 25 feet. The advance contingent is deployed in a staggered diagonal formation, with the lead plow in advance of the other two. Snow from the first plow is picked up by the second which passes it to the third to form a high ridge of snow for the rotary snow thrower. It is important that the snow entering the maw of the thrower be of sufficient quantity to make maximum use of the device.

With the 100 various pieces of equipment at its disposal, JFK is in the luxury class. Other airports are less fortunate and airport managers must often substitute ingenuity for horsepower. A standard practice is to share the use of municipally or state owned snow removal equipment to supplement that owned by the airport.

FAA-sponsored tests of chemicals to remove snow, ice and slush have shown promising results at temperatures as low as −10 degrees.

The Monsanto Research Corp., Dayton, Ohio, under FAA contract, has demonstrated that a mixture of 75 per cent tripotassium phosphate and 25 per cent formamide produced the best results in its tests. Nine de-icing chemicals were tried out and then combined in various mixtures, with corrosion inhibitors added to minimize chemical reaction on metal aircraft parts.

The tripotassium and formamide mixture, both commercially available, produced less corrosion than the commonly used salt mixtures. The product can be assembled at reasonable cost and does not cause excessive damage to runway surfaces. In pellet form, this nontoxic mixture is applied at a rate equivalent to sand or salt application on highways and may be spread with the same kind of equipment.

Further tests on storage, application rates and the effects of the mixture on concrete, rubber and grass will be conducted by the FAA before final recommendations for operational use are made.

The FAA is not the only Government agency battling the snow problem. Offi-

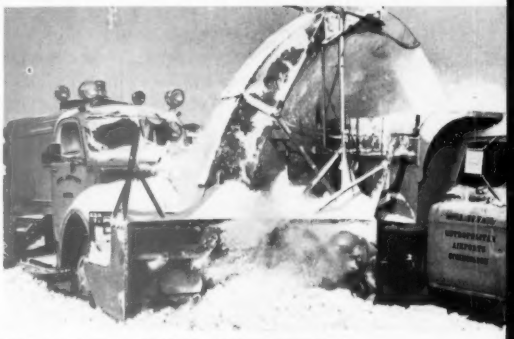
Rx for Snow: HIGH SPEED TEAM PLOWING

New machines and techniques mechanize the war on snow

Homemade roller, International Falls, Minn.

Cab-on-plow is latest snow blower development.

Brush early, save labor later.



Early type snow loader still does good job.

Highway equipment is okay for airports.

Road grader tackles snow.

cials at Kincheloe Air Force Base, Mich., confronted with icy runways, have had successful results using a discontinued type of aircraft de-icer fluid.

They rigged a 5,000-gallon tank truck with a 10-foot spray bar behind. The tanker is loaded with a solution of water (70 per cent) and alcohol (30 per cent) and run down the runway in four passes for the first 3,000 feet on the takeoff end and four widths at the opposite end. What remains in the tank is spread in a run up the centerline. It was discovered that 1,000 gallons would effectively clean about a 100-foot wide strip down the center of the runway.

The "softening up" operation is followed with conventional snow removal equipment and a Sicard air blast sweeper.

The Kincheloe experiments, reported in *Aerospace Safety*, make an important point when it calls attention to the problem of foreign object damage created by running automotive equipment on runways, taxiways and ramps. Drag blades and snow plows have a tendency to shed nuts, bolts, pins and bits of metal that present an ingestion hazard, particularly for jet aircraft. Airport officials at Kincheloe make frequent use of electro-magnetic sweepers to pick up this debris.

While research on snow removal continues and new machinery, chemicals and techniques are developed, nothing conquers a snow storm in the here and now, like prompt reaction, regardless of when the snow starts falling. An accumulation of two inches is the "go" sign; beyond that it is an uphill fight.

Chemical warfare on Jack Frost takes a different form at Missoula County Airport, Mont., where they dye the snow to mark the runway boundaries.

Using homemade equipment and a commercial dye, airport operators can apply a four-foot-wide border around both sides of the 5,000-foot runway for about 85 cents. The dye, called Rhodamine-B, made by the E. I. duPont de Nemours Co., is a liquid which comes in 50-pound barrels which hold about 15 gallons and costs $100. Other sizes are available.

The equipment at Missoula is inexpensive and consists of two 55-gallon barrels to hold the solution. A small centrifugal pump powered by a 3-h.p. air cooled engine pumps the liquid through an adjustable nozzle at the end of a four-foot boom. The density of the dye marking is controlled by the speed of the spray vehicle, a half-ton pickup that easily carries the whole kit.

famous flights

Hindenburg . . .

DEATH OF AN ERA

By John G. Leyden

The first indication of trouble was a muffled denotation like the sound a kitchen gas range makes when the flame is lighted. But only a few heard it. And by then it was too late to do anything anyway.

A split second later, the small band of newsmen and spectators gathered in the rain at the Lakehurst Naval Air Station in central New Jersey saw a bright column of red, orange and yellow fire spout from the German dirigible *Hindenburg* just forward of the upper vertical fin. The 803-foot hull of the airship, shuddering with each new explosion of hydrogen gas, cracked near the stern and fell slowly from the sky like a wounded bird.

Herb Morrison, an enterprising young radio announcer from Station WLS in Chicago, was one of those who stood in the gathering darkness of the New Jersey pine woods on May 6, 1937, and looked on in stunned disbelief at the scene of unparalleled horror and tragedy unfolding before him. His calm description of the *Hindenburg's* arrival, which was being transcribed for later rebroadcast, degenerated swiftly into a hysterical and unforgettable jumble of words:

". . . It's burst into flames . . . Get this, Charlie. Get this, Charlie (WLS sound engineer Charles Nehlsen). . . . Get out of the way, please. Oh my, this is terrible. Oh my. Get out of the way, please. It is burning, bursting into flames and is falling on the mooring mast and all the folks. . . . This is one of the worst catastrophes in the world. . . . Oh, it's four or five hundred feet in the sky. It's a terrific sight. . . . Oh, the humanity and all the passengers. . . ."

A soft rain was falling at Frankfurt's Rhein-Main World Airport when the *Hindenburg* began its final voyage at 8:15 on the evening of May 3, with 46-year-old Captain Max Pruss, a veteran of the World War I *Zepplin* raids against London, in command. While a brightly-uniformed brass band drummed out martial music, the huge airship lifted into the air, paused briefly in the crossed beams of a battery of powerful searchlights, and then disappeared into the night.

Powered by four diesel engines, the *Hindenburg* proceeded north from Frankfurt, cruising at 77 m.p.h. at an altitude of 800 to 1,000 feet, past the cathedral city of Cologne and then west across Holland to the North Sea. Here, the dirigible turned south and flew parallel to the coast of Belgium and France, through the Straits of Dover and the English Channel, and out over the broad Atlantic.

The route was a familiar one. In 1936, its first year in service, the *Hindenburg* had made 10 round trips to the U. S., carrying more than 1,000 passengers. Another eight flights had been made to South America, including one just two months earlier, all without major incident.

Now in its first North Atlantic crossing of the 1937 season, the *Hindenburg* was battling strong headwinds, which would postpone its arrival in the United States by eight hours. An additional delay was encountered when the airship reached Lakehurst at four o'clock on the afternoon of May 6 after passing over Boston, Providence and New York City.

A severe electrical storm was in progress in the area, and the *Hindenburg* flew slowly off down the New Jersey coast awaiting a break in the weather. At 6:12 p.m., the commander of the Naval Air Station recalled the airship by radio, and it arrived back over the field shortly after seven o'clock.

A light rain was still falling, but the sky showed signs of clearing from the west, as the *Hindenburg* made its final approach to the 75-foot high mooring mast. At 7:21 p.m., the forward handling lines were dropped to the waiting ground crew 200 feet below.

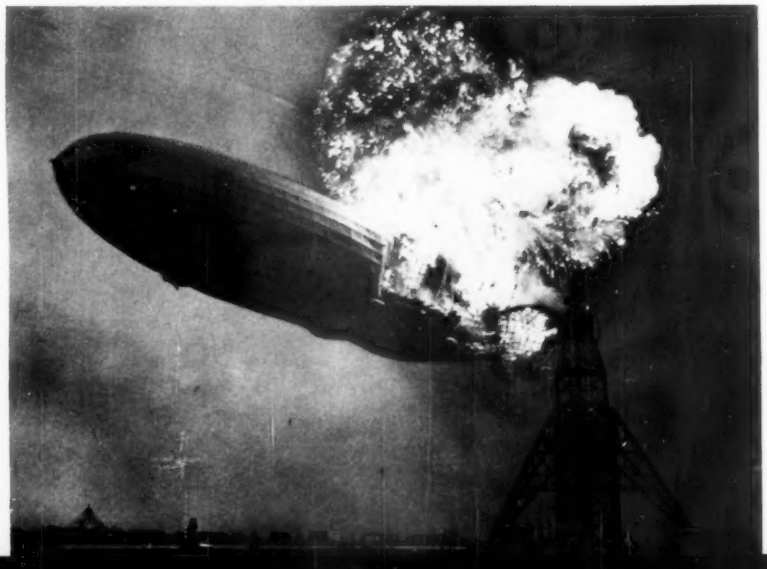
The first flames were sighted four minutes later at 7:25 p.m., some 50 feet forward of the upper vertical fin over hydrogen gas cells number four and five. From this point the fire spread rapidly in all directions, moving forward at high velocity with a succession of muffled explosions as additional gas cells were ignited. Thirty-two seconds after the fire began, the blazing aluminum skeleton of the *Hindenburg* collapsed to the ground —a crumbling maze of twisted and blackened wreckage.

Both the German and United States governments investigated the disaster and concluded the probable cause was the ignition of free hydrogen escaping from the after gas cells. Both accident reports mentioned "brush discharge" due to atmospheric electrical disturbances as a possible source of ignition. The possibility of sabotage was mentioned, and this possibility was developed by several authors, including A. A. Hoehling and Admiral Charles E. Rosendahl, a technical advisor to the U. S. inquiry board.

On board the *Hindenburg* at the time of the accident were 36 passengers, about half the airship's capacity. Twenty-three managed to leap to safety, many while the dirigible was still in the air, but 13 perished in the flames. A ground handler and 22 of the 61 crewmembers also died in the fire.

The death of the *Hindenburg* was one of the worst and most spectacular disasters in the history of aviation, and finished the rigid airship as a passenger-carrying vehicle. An era was over almost before it had begun.

Photo credit: Lighter-than-Air Society



Letters

FAA

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• Doctor Is Grateful

(The following letter was sent to FAA Administrator William F. McKee and is presented in abbreviated form.)

During the nine years that I have been a licensed pilot I have been impressed with the ability, enthusiasm and good will with which the personnel of the FAA perform their duties and render service to all segments of the United States aviation.

A striking example of the alertness of a tower staff member occurred . . . at Baer Field, Fort Wayne, Ind., as I was making an instrument approach at approximately 9 a.m. . . . I had neglected to lower my landing gear on final.

Although the approach end of the runway (I was using) is farthest from the tower, my approach short and visibility limited . . . I was advised by Merwin Hayes . . . (Fort Wayne tower) that my landing gear did not *appear* to be lowered.

I emphasize the word *appear*. After landing I (went) to the tower to thank Mr. Hayes . . . for saving me from an embarrassing and costly accident and in . . . conversation learned that . . . limitations on visibility and the configuration of my *Aero-Commander* did not permit him to be certain that the gear was not down. Nevertheless, he did not hesitate to speak up. He was concerned . . . a wonderful thing to see in young people.

Thomas S. Lastrapes, M.D.
Marion, Ohio

• Pilot Pedagogue Poses Problem

I am a rated pilot in the Strategic Air Command, currently qualified as an instructor pilot in tactical aircraft. I have accumulated approximately 6,900 military flying hours which includes 2,450 as an instructor pilot. In addition, I hold a currently valid FAA commercial pilot license with a flight instructor rating which was issued in 1945 and renewed in 1961. Also, I have logged approximately 4,500 hours in general aviation aircraft of which almost 2,500 hours are as an instructor. My last flight as a civilian instructor was in August 1963.

Can I keep my FAA instructor certificate current, as defined in FAR Amendment 61-18, if I continue to instruct military pilots only?

Wurtsmith AFB, Mich.

The inspector to whom you apply for the renewal of your certificate may recognize your satisfactory performance as a military flight instructor as evidence of your flying competence as an instructor. It is possible that he will want to confirm your knowledge of current flight instructor responsibilities and procedures and pilot certification requirements by a simple oral examination or discussion.

An official statement of your flight instruction experience during the certification renewal period, including a record of your students in passing their pilot flight checks, will be helpful to the inspector in making his determination.

• Law Violation?

Enclosed is a business card which was handed to me and promptly made me ask questions. The card introduces this person as a "United States Government Commercial Flight Instructor." In my way of thinking, it means that he is employed by the United States Government. It would appear he is using the title to his advantage. Perhaps I'm all wet on this subject so I'd appreciate an authoritative answer.

New York

The representation or implication that one is an employee of, or associated with, the United States in furtherance of one's business, when such is not actually the case, is an apparent violation of the Federal trade laws. We shall investigate the instance which you have pointed out.

• Famous Flight Follower

Your "Famous Flights" series—what happened? Couldn't find one in my November issue of *FAA Aviation News*.

Los Angeles

We intend to run "Famous Flights" frequently, but not necessarily monthly. Delighted you're interested.

• VFR Canadian Style

I refer rather belatedly to an item on the Letters page of *FAA Aviation News* re "Flying on Top." As more American pilots appear to be entering Canada each year . . . it might be wise to point out that "on top flight" in Canada is not permitted under the visual flight rules. *Canadian Air Regulations*, Part V, Division III, Para. 540, states in part: "When operated in accordance with the visual flight rules (VFR), aircraft shall be flown *with visual reference to the ground or water.*"

I . . . suggest concerned parties refer to the *International Flight Information Manual* published by the FAA.

J. V. Henderson
Ottawa, Ont.

The latest edition of the International Flight Information Manual *is Vol. 13, April 1965. Send check or money order for $1.25 to Superintendent of Documents, Washington, D. C. 20553.*

"VFR on Top" as practiced in the United States is illegal in Canada because a pilot must be in visual sight of the ground or water for navigation purposes and must descend VFR. However, "barracks room" lawyers could argue forever about what amount of cloud cover could exist before a pilot is unable to navigate with visual reference to ground or water. Case in point: "A mountain peak projecting above a cloud layer still indicates visual reference with the ground." However, the intent of the Canadian regulation is that while it is possible to have some clouds below you, you must still be able to navigate by visual reference to the ground and your flight condition is VFR, not VFR on Top.

• He'd Educate 'Em

An expression of concern by the FAA about the role of alcohol in private plane crashes was brought to my attention recently. While your Agency indicated that it proposed to make it illegal for a private pilot to drink during or eight hours prior to flying, it also recognized that such a rule would be difficult to prove or enforce. . . . The only obvious alternative to legislation is education. . . . You can control what . . . (pilots) must learn to become pilots through . . . your license examination procedures and tests.

I am not suggesting the inclusion of moral lectures, but rather the teaching, at least basically, of the effects of flying on human physiology and performance, how these are affected as the environment changes, and then the interaction of these with alcohol. . . .

With the increasing use of chemical agents to deliberately modify the behavior of people who are not hospitalized, I am personally quite concerned about the patient's awareness of the accompanying side effects. . . . Even simple "cold" remedies, especially of the anti-histamic variety, can significantly impair performance in terms of vision, alertness and motor control.

Dr. William J. Baker, Ph.D.
Associate Project Director
Drug Effects and Human Performance
Silver Spring, Md.

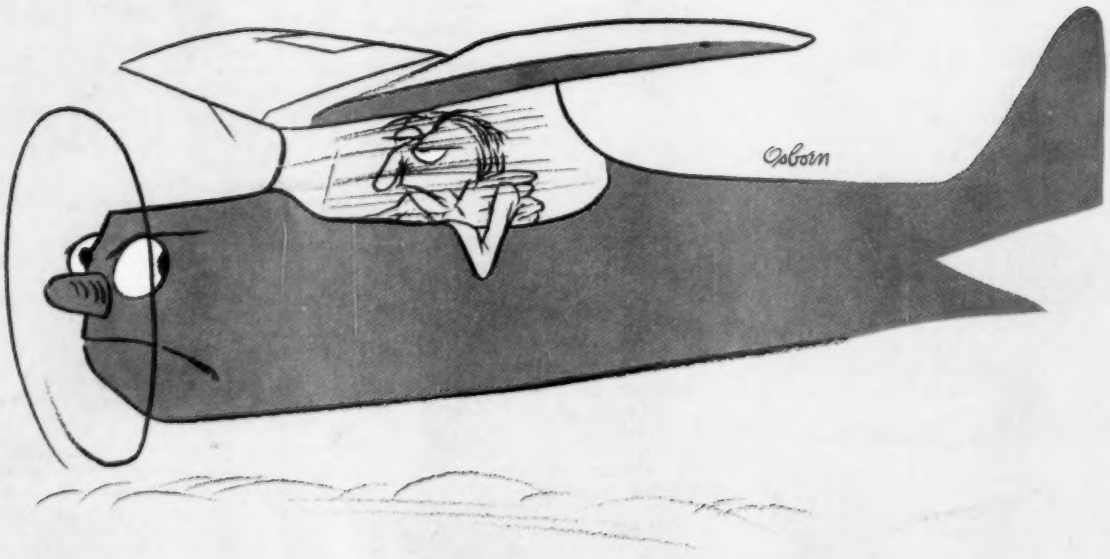
Your comments are very timely. The FAA is attacking the problem from both the regulatory and educational viewpoints. It is especially interested in your suggestions to incorporate material in the pilot examinations to educate examinees and to increase awareness on the part of pilots, instructors and operators.

U.S. GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON, D.C. 20402
OFFICIAL BUSINESS
RETURN AFTER 5 DAYS

AVN/SEPT O#415-66
LIBRARIAN, USAAVNS
BLDG 5907
FORT RUCKER ALA

POSTAGE AND FEES PAID
U.S. GOVERNMENT PRINTING OFFICE

No booze, no drugs, no sleepless nights,



Should top check lists for all your flights.